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11. (Previously presented) A quantum tunneling device formed in accordance with a method comprising the steps of:

providing a quantum well, said quantum well comprising a composite material, said composite material comprising at least a first and a second material; and processing said quantum well so as to form at least one segregated quantum tunneling structure encased within a shell comprised of a material arising from processing said composite material, wherein each said segregated quantum structure is substantially comprised of said first material.

20. (Previously presented) A quantum tunneling device formed in accordance with a method comprising the steps of:

providing a quantum well, said quantum well comprising at least three layers, each of said at least three layers comprising a first material, wherein at least one of said at least three layers additionally comprises at least a second material; and processing said quantum well so as to form at least one segregated quantum structure comprising at least said second material encased in a material arising from processing said first material.

39. (Previously presented) A quantum tunneling device formed in accordance with a method comprising the steps of:

growing a quantum well on a substrate, said quantum well comprising at least a first material and a second material;  
pattern a mask on said quantum well;  
etching said quantum well so as to form a pillar; and  
processing said pillar so as to convert said first material thereby forming an altered first material and causing said second material to form at least one segregated quantum structure embedded in said altered first material.

40. (Original) A quantum tunneling device comprising:

at least one segregated quantum structure; and  
a casing of a first material encapsulating said at least one segregated quantum structure, wherein said casing is sufficiently thin so as to permit quantum tunneling of electrons from a first segregated quantum structure to a structure selected from the group consisting of segregated quantum structures and electrodes.

41. (Original) The quantum tunneling device according to claim 40 wherein said at least one segregated quantum structure has a diameter of less than about 200 nanometers.

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42. (Original) The quantum tunneling device according to claim 40 wherein said at least one segregated quantum tunneling structure has a diameter of less than about 50 nanometers.

43. (Original) The quantum tunneling device according to claim 40 wherein said segregated quantum structure comprises a material selected from the group consisting of silicon, germanium, carbon, tin, gallium, arsenic, indium, aluminum, phosphorus, boron, antimony, nitrogen, zinc, sulfur, selenium, tellurium, cadmium, mercury, lead, and mixtures thereof.

44. (Original) The quantum tunneling device according to claim 40 wherein said first material comprises a material selected from the group consisting of silicon, germanium, carbon, tin, gallium, arsenic, indium, aluminum, phosphorus, antimony, nitrogen, zinc, sulfur, selenium, tellurium, cadmium, mercury, and mixtures thereof.

45. (Original) The quantum tunneling device according to claim 40 wherein said first material has been altered by a process selected from the group consisting of oxidation, reduction, and nitridation.

46. (Original) The quantum tunneling device according to claim 40 wherein said first material comprises a semi-conductive material selected from the group consisting of elements of group IIA of the periodic table, elements of group IIIA of the periodic table,

elements of group IVA of the periodic table, elements of group VA of the periodic table,  
elements of group VIA of the periodic table, and mixtures thereof.

47. (Original) The quantum tunneling device according to claim 40 wherein said  
quantum tunneling device has no dimension greater than 500 nanometers.

48. (Original) The quantum tunneling device according to claim 40 wherein said casing  
is substantially non-crystalline.

49. (Original) The quantum tunneling device according to claim 40 wherein said at least  
one segregated quantum structure is substantially crystalline.

51. (Original) An electronic device comprising:  
a quantum tunneling device, said quantum tunneling device comprising at least  
one segregated quantum structure and a casing of a first material encapsulating  
said at least one segregated quantum structure; and

at least one electrode, wherein said casing is sufficiently thin so as to permit quantum tunneling of electrons from a segregated quantum structure to said at least one said electrode.

52. (Original) The electronic device according to claim 51 wherein each said segregated quantum structure has a diameter less than about 200 nanometers.

53. (Original) The electronic device according to claim 51 wherein each said segregated quantum structure has a diameter less than about 100 nanometers.

54. (Original) The electronic device according to claim 51 wherein each said segregated quantum structure has a diameter not exceeding about 25 nanometers.

55. (Original) The electronic device according to claim 51 wherein said segregated quantum structure comprises a material selected from the group consisting of silicon, germanium, carbon, tin, gallium, arsenic, indium, aluminum, phosphorus, boron, antimony, nitrogen, zinc, sulfur, selenium, tellurium, cadmium, mercury, lead, and mixtures thereof.

56. (Original) The electronic device according to claim 51 wherein said first material comprises a material selected from the group consisting of silicon, germanium, carbon, tin, gallium, arsenic, indium, aluminum, phosphorus, boron, antimony, nitrogen, zinc, sulfur, selenium, tellurium, cadmium, mercury, lead, and mixtures thereof.

57. (Original) The electronic device according to claim 51 wherein said first material comprises a semi-conductive material selected from the group consisting of elements of group IIA of the periodic table, elements of group IIIA of the periodic table, elements of group IVA of the periodic table, elements of group VA of the periodic table, elements of group VIA of the periodic table, and mixtures thereof.

58. (Original) The electronic device according to claim 51 wherein said first material has been altered by a process selected from the group consisting of oxidation, reduction, and nitridation.

59. (Original) The electronic device according to claim 51 wherein said at least one electrode comprises a material selected from the group consisting of lithium, beryllium, boron, carbon, nitrogen, oxygen, aluminum, silicon, calcium, titanium, vanadium, manganese, iron, cobalt, nickel, copper, zinc, gallium, germanium, arsenic, yttrium, zirconium, niobium, molybdenum, palladium, silver, cadmium, indium, tin, antimony, barium, tantalum, tungsten, iridium, platinum, gold, mercury, thallium, lead, bismuth, and mixtures thereof.

60. (Original) The electronic device according to claim 51 wherein said segregated quantum structure is substantially crystalline.

61. (Original) The electronic device according to claim 51 wherein said casing is substantially non-crystalline.

62. (Original) The electronic device according to claim 51 wherein said electronic device is operational at temperatures in excess of about 1K.

63. (Original) The electronic device according to claim 51, wherein said electronic device is operational at temperatures in excess of about 200K.